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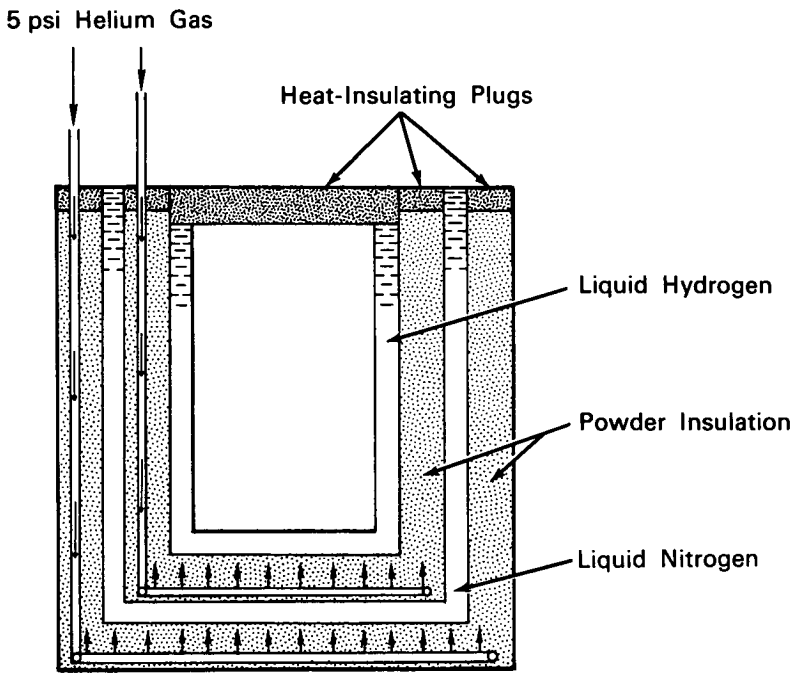
NASA TECH BRIEF

This NASA Tech Brief is issued by the Technology Utilization Division to acquaint industry with the technical content of an innovation derived from the NASA space program.

Low-Cost Insulation System for Cryostats Eliminates Need for a Vacuum



The problem: Cryostats (vessels in which test samples are kept at cryogenic temperatures) are generally constructed as a series of concentric shells. The spaces between some of these shells are conventionally filled with powdered insulation and maintained at very low vacuums. In spite of these precautions, some of the residual air trapped between the powder particles frequently becomes liquid, which reduces the insulation efficiency of the powder, and in some cases presents an extreme safety hazard.

The solution: Instead of evacuating the annular spaces filled with insulating material, they are pressurized with helium gas at 5 psi.

How it's done: As in the conventional design, a powder insulation is used in the space between the two outer shells and in the space between the shells separating the liquid nitrogen from the liquid hydrogen. When the cryostat is being cooled down to reach equilibrium temperature for liquid hydrogen, helium gas at 5 psi is bled into the bottom of the powder insulation compartments. The resultant upward helium flow will prevent any air from being left in or drawn into the insulation to form liquid air.

In an evaluation of the new system it was found that the system is not only more practical but also economically competitive with the old system.

(continued overleaf)

Notes:

1. This system is useful for any liquid hydrogen system where long-time operation is not required.
2. For further information about this innovation inquiries may be directed to:

   Technology Utilization Officer
   Lewis Research Center
   21000 Brookpark Road
   Cleveland, Ohio 44135
   Reference: B63-10365

Patent status: NASA encourages the immediate commercial use of this invention. It is owned by NASA and inquiries about obtaining royalty-free rights for its commercial use may be made to NASA Headquarters, Washington, D.C. 20546.

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(Lewis-64)